

Entrepreneurial ecosystem research: present debates and future directions

Angelo Cavallo¹ · Antonio Ghezzi¹ ·
Raffaello Balocco¹

Published online: 4 June 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract The purpose of this article is to review the emerging research on entrepreneurial ecosystem and to guide future research into this promising area. The study presents a critical review on the entrepreneurial ecosystem, starting from its very definition and antecedents. Combining prior research with building on the main concepts that constitute an entrepreneurial ecosystem, we have developed an original set of guidelines that can help scholars and practitioners seeking an answer to the following pressing question: “How can we gain a comprehensive understanding of an entrepreneurial ecosystem?”. We will then discuss the opportunities for expanding our current knowledge on entrepreneurial ecosystems and describe the current debates and directions for future research. Lastly, we will provide guidelines that policymakers may take into consideration when designing and issuing support measures to promote entrepreneurship in their local ecosystems.

Keywords Entrepreneurial ecosystem · Entrepreneurship · New ventures · System

Introduction

Entrepreneurship has been widely recognized as the engine of countries’ economic growth (e.g. Davidsson et al. 2006; Wong et al. 2005; Mason and Brown 2013) and, to

✉ Angelo Cavallo
angelo.cavallo@polimi.it

Antonio Ghezzi
antonio1.ghezzi@polimi.it

Raffaello Balocco
raffaello.balocco@polimi.it

¹ Politecnico di Milano, Department of Management, Economics and Industrial Engineering, Via Lambruschini, 4/B, 20156 Milan, Italy

date, the extant literature in entrepreneurship has mostly been concerned with the characteristics and behaviours of individuals or firms (Shane 2003; Shane and Venkataraman 2000). This is still the case, despite the long legacy of many disciplines, including geography (Malecki 1997; Ritsilä 1999), sociology (Sorenson and Audia 2000) and business research (Dubini 1989; Bahrami and Evans 1995), where a strong emphasis has been placed on the importance of the relationships between entrepreneurs and their local economic and social contexts. Indeed, several scholars have highlighted the need to understand entrepreneurship in broader settings, such as their regional, temporal and social arenas (Autio et al. 2014; Spilling 1996; Van de Ven 1993; Zahra and Wright 2011; Zahra et al. 2014; Colombelli et al. 2017). So far, no holistic approach to entrepreneurship has focused on its interrelated aspects (Alvedalen and Boschma 2017). With reference to this point, recent studies have shown that scholars widely agree that the systemic nature of entrepreneurial activity is still underdeveloped (Acs et al. 2014; Gustafsson and Autio 2011; Qian et al. 2012; Szerb et al. 2013) and few studies embrace entrepreneurship from a truly systemic and interdisciplinary perspective (Acs et al. 2014; Qian et al. 2012).

As a result, a new concept that goes in the direction of offering a “systemic view of entrepreneurship” has recently emerged, known as the Entrepreneurial Ecosystem (EE).

Although previous research has already described how interaction among entrepreneurs and other contextual elements/actors may create the conditions for the long-term entrepreneurial success (see Saxenian 1994; Spilling 1996; Neck et al. 2004; Kenney and Patton 2005; Feldman 2001; Aoyama 2009), the EE concept gained momentum through the pioneering studies of Cohen (2006), Isenberg (2010); Feld (2012). Their works contributed towards spreading the idea amongst leading entrepreneurs and policymakers that the community and culture of a given place can have a significant impact on entrepreneurship (Stam and Spigel 2016; Feld 2012; Spigel 2017; Mack and Qian 2016). In turn, the growing popularity of this concept also led scholars into investigating EE. Empirical studies focused on how a rich EE enables entrepreneurship and the subsequent creation of value at regional level (Fritsch 2013; Tsvetkova 2015). Other authors have investigated the subject at city level, including Mack and Mayer (2016), who explored entrepreneurial (ecosystem) successes in Phoenix (Arizona) and Spigel (2017), who covered the same subject in Waterloo and Calgary (Canada). Recently, Acs et al. (2014) identified a strong EE in a multi-country study and, by employing a large scale quantitative method, were able to demonstrate how different underlying local factors are associated with high levels of innovative entrepreneurship.

As well as these valuable contributions, Stam (2015, p. 1764) argued that “seductive though the entrepreneurial ecosystem concept is, there is much about it that is problematic and the rush to employ the entrepreneurial ecosystem approach has run ahead of answering many fundamental conceptual, theoretical and empirical questions”. This call for action was well received and shared among the academic community, as witnessed by the recent special issues covering the topic published in *Small Business Economics* and the *Strategic Entrepreneurship Journal*. Thus, a number of international conferences and special issues have specifically addressed the question of advancing entrepreneurial ecosystem research. As a result, we have taken note of several recent and extremely valuable contributions on the topic of EE (Fig. 1). For instance, Kuratko et al. (2017) have illustrated the paradox of new venture legitimation within EEs, while Acs et al. (2017a, b) have examined the roots of EE in terms of its antecedents in

literature. Sussan and Acs (2017) have proposed an integrated framework of the “digital entrepreneurial ecosystem” composed of the highly innovative *Schumpeterian* (1911) entrepreneurs involved in creating digital companies and innovative products and services for many users and agents in the global economy (Acs et al. 2017a, b).

To sum up, particular attention has been dedicated to defining the EE and its key attributes (Roundy et al. 2017), although the debate is still ongoing, leaving room for further contributions. For instance, questions are being raised concerning the antecedents of EE literature that stem from strategy, entrepreneurship and regional development literature (Yun et al. 2017; Erina et al. 2017). In addition, scholars are currently discussing how to measure the entrepreneurial ecosystem and gain a comprehensive understanding of the subject matter. In a similar vein, bearing in mind the wide variety of actors involved in the entrepreneurial process, policymakers are struggling to identify the key action points and support the necessary measures to create and nurture entrepreneurship (Jung et al. 2017).

In response to the highly theoretical and practical relevance of the topic, we have conducted a critical review of the literature on EEs and are presenting here a set of original guidelines to advance the current understating of entrepreneurial ecosystems. Hence, the goals of this study are to review the extant research on entrepreneurial ecosystems (which stems from the fields of entrepreneurship, strategy and regional development literature) and to suggest several major research directions for guiding future theoretical and empirical research, with the objective of aiding a better understanding of entrepreneurial ecosystems at national and regional levels.

The structure of this study is as follows. In the next section, we have briefly described the method used to identify the existing contributions that deal with entrepreneurial ecosystem research. In Section “[Defining the Entrepreneurial Ecosystem](#)”, starting from a biological analogy and building on previous contributions, we have defined what we mean by entrepreneurial ecosystem. In Section “[Antecedents of the Entrepreneurial Ecosystem](#)”, we have presented an ongoing and currently open discussion on the antecedents of research into EEs. Next, we have developed the investigation guidelines

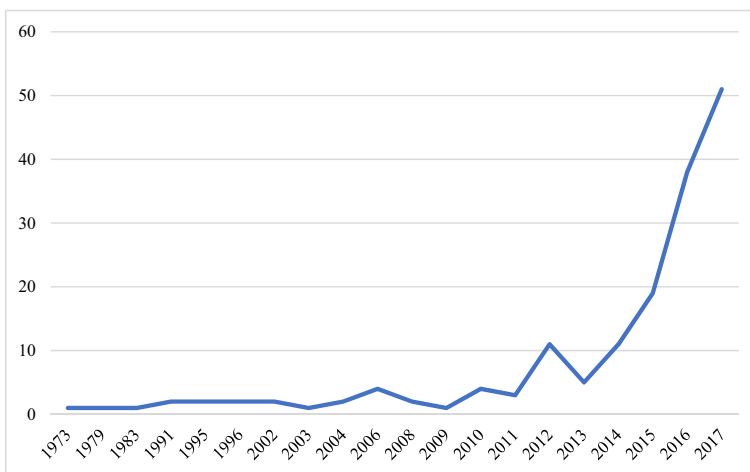


Fig. 1 Academic articles and proceedings on “Entrepreneurial Ecosystem” in Scopus Database (accessed 22 September 2017)

needed to gain a comprehensive understanding of EEs (Section “[Entrepreneurial Ecosystem Research: Investigation Guidelines](#)”) and outline the direction of future research (Section “[Avenues for future research on Entrepreneurial Ecosystem](#)”). The final section sets out the conclusions and discusses the contributions of the study, as well as the implications for practice and policy-making.

Method

The review is based on academic articles, conference proceedings and books covering the Entrepreneurial Ecosystem published between January 1970 and September 2017.

Similarly to previous reviews (e.g., Barreto 2010; Di Stefano et al. 2010; Zott et al. 2011; Felekoglu and Moultrie 2013; West and Bogers 2013; Ghezzi et al. 2017), the study adopts a multi-step process.

The review began with a search through the SciVerse Scopus online database for scientific articles and books on entrepreneurial ecosystems. Since Scopus is less selective than the database provided by the Web of Science, this potentially means that the process searched through a greater number international outlets and these, in turn, were potentially more receptive to the emerging topic of entrepreneurial ecosystems.

The decision to include conference proceedings and books in this review came from the need to take account of “grey literature” (i.e. the heterogeneous body of published material that has not been submitted to the traditional peer review process – Adams et al. 2016) and so include the more novel and relevant findings of this particularly dynamic research stream, thereby avoiding the problem of a lack of immediacy determined by the lag in academic knowledge (Adams et al. 2017).

As result of our first selection step, the initial sample brought up 163 documents. These 163 articles, from a total of 118 journals, were searched using two search strings, “entrep* ecosystem” and “entrep* system”, and then downloaded as bitext files and run through RStudio software. The selected documents included articles and conference proceedings (a decision founded on the recent fast growth of literature on EE) from 1970 to 2017.

As a second step, the initial sample of documents was further tweaked by applying the following criteria: (i) the words “entrepreneurial ecosystem/s” had to appear in the title, abstract or keywords; (ii) the documents had to be written in English; and (iii) the documents had to explicitly relate to entrepreneurial ecosystems and had to be relevant, as inferred through a critical and detailed inspection on the part of the authors. The first criterion helped us to identify the contributions that were explicitly concerned with entrepreneurial ecosystems. However, in order to capture an inclusive spread of the antecedents of EE (such as entrepreneurial systems and regional ecosystems of entrepreneurship), a third criterion was introduced, acting as both an exclusion and inclusion criterion, which allowed us to discard irrelevant articles while adding others that were relevant. Moreover, the third criterion reflects our aim of being critical rather than systematic (or bibliometric) (e.g. see the reviews from De Massis et al. 2013; Zott et al. 2011, who followed the same approach), and so be informed by a selection of the most relevant studies.

This second step led to the sample being significantly reduced. According to the criteria applied, a total of 47 articles were found to be relevant to EE research and these were therefore selected. Details of the 47 articles selected are outlined in Table 1, together with the following information: Authors, Title and Journal.

Defining the entrepreneurial ecosystem

While the term “entrepreneurial”¹ and its meaning appear intuitive when describing an entrepreneurial ecosystem, the word ecosystem deserves further discussion (Stam 2015). Etymologically, the term ecosystem is composed of the Greek words “οἶκος” – “eco”, which means “home” – and “συστήμα” - “system”, which means “complex”, and so it evokes both a sense of hospitality and acceptance and of complexity. An ecosystem is, therefore, a complex system hosting a number of entities. The concept of an ecosystem has been used mainly in the field of biology: first introduced by Tansley (1935), the ecosystem was initially an interactive system of living organisms – i.e. the biotic component – within their physical environment – i.e. the abiotic component. (Tansley 1935; Molles 2002; Chapin et al. 2002; Schulze et al. 2005; Gurevitch et al. 2006; Smith et al. 2012). This biological analogy is frequently employed by scholars in the fields of economics and management. Marshall was the first to put forward this biological analogy (Thomas 1991), followed by Alchian (1950), who focused on how the topic of maximizing profit. However, the most widely recognized use of a biological analogy was that introduced by Nelson Richard and Winter Sidney (1982). Based upon selection mechanism analogies drawn from evolutionary biology (Darwin 1859), these authors devised the first evolutionary economic theories. Later, the concept of ecosystem was introduced into management literature, first by Moore (1993) and then by Iansiti and Levien (2004). According to Moore, “business ecosystems condense out of the original swirl of capital, customer interest, and talent generated by a new innovation, just as successful species spring from the natural resources of sunlight, water, and soil nutrients” (Moore 1993, p. 76). In other words, a business ecosystem is a network of interconnected organizations that are likely to operate around a focal firm or platform (Iansiti and Levien 2004; Teece 2007; Clarysse et al. 2014). This analogy with biological ecosystems in substance leads back to the complexity of relationships and interdependencies, which is also a feature of business ecosystems, in terms of both their nature and the manner in which the interested players interact. This original concept has given rise to a vast number of ecosystem types (Theodoraki and Messegem 2017), among which are university-based ecosystems (Rice et al. 2014), sector-based information and communication technology ecosystems (Letaifa and Rabeau 2013), organizational ecosystems (Mars et al. 2012) and innovation or knowledge ecosystems (Clarysse et al. 2014; Zahra and Nambisan 2011). The latter, in particular, have consistently captured the attention of scholars. Autio and Thomas (2014) defined an innovation ecosystem as a “network of interconnected organizations, organized around a focal firm or a platform, and incorporating both production and use side participants, and focusing on the development of new value through

¹ Being entrepreneurial is defined as exploring, evaluating and exploiting opportunities for creating new goods and services (Schumpeter 1934; Shane and Venkataraman 2000).

Table 1 Selected studies on entrepreneurial ecosystem research

Author (Year)	Article's Title	Source
Quinn (1979)	Technological innovation, entrepreneurship, and strategy	<i>Sloan Management Review</i>
Van de Ven (1993)	The development of an infrastructure for entrepreneurship	<i>Journal of Business venturing</i>
Watson et al. (1995)	Business owner-managers' descriptions of entrepreneurship: A content analysis	<i>Journal of Constructivist Psychology</i>
Spilling (1996)	The entrepreneurial system: On entrepreneurship in the context of a mega-event	<i>Journal of Business Research</i>
Hoskisson et al. (2004)	Corporate governance systems: Effects of capital and labor market congruency on corporate innovation and entrepreneurship and global competitiveness	<i>Journal of High Technology Management Research</i>
Iansiti and Levin (2004)	Strategy as ecology	<i>Harvard business review</i>
Neck et al. (2004)	An Entrepreneurial System View of New Venture Creation	<i>Journal of Small Business Management</i>
Schramm (2004)	Building entrepreneurial economies	<i>Foreign Affairs</i>
Cohen (2006)	Sustainable valley entrepreneurial ecosystems	<i>Business strategy and the environment</i>
Adner and Kapoor (2010)	Value creation in innovation ecosystems: how the structure of technological interdependence affects firm performance in new technology generations	<i>Strategic Management Journal</i>
Harrison and Leitch (2010)	Voodoo institution or entrepreneurial university? spin-off companies, the entrepreneurial system and regional development in the UK	<i>Regional Studies</i>
Isenberg (2010)	How to start an entrepreneurial revolution	<i>Harvard business review</i>
Isenberg (2011)	The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship	<i>Presentation at the Institute of International and European Affairs</i>
Malecki (2011)	Connecting local entrepreneurial ecosystems to global innovation networks: open innovation, double networks and knowledge integration	<i>International journal of entrepreneurship and innovation management</i>
Roberts and Eesley (2011)	Entrepreneurial impact: the role of MIT	<i>Foundations and Trends in Entrepreneurship</i>
Feld (2012)	Startup communities: Building an entrepreneurial ecosystem in your city	<i>Start-up Communities: Building an Entrepreneurial Ecosystem in Your City (Book)</i>
Pitelis (2012)	Clusters, entrepreneurial ecosystem co-creation, and appropriability: a conceptual framework	<i>Industrial and corporate change</i>
Nambisan and Baron (2013)		<i>Entrepreneurship: theory and practice</i>

Table 1 (continued)

Author (Year)	Article's Title	Source
Qian et al. (2012)	Entrepreneurship in innovation ecosystems: entrepreneurs' self-regulatory processes and their implications for new venture success Regional systems of entrepreneurship: the nexus of human capital, knowledge and new firm formation	<i>Journal of Economic Geography</i>
WEF (2013)	Entrepreneurial Ecosystems Around the Globe and Company Growth Dynamics	<i>World Economic Forum (WEF) Research Policy</i>
Acs et al. (2014)	National systems of entrepreneurship: Measurement issues and policy implications	<i>The Oxford Handbook of Innovation Management</i>
Autio and Thomas (2014)	Innovation ecosystems	<i>Research policy</i>
Autio et al. (2014)	Entrepreneurial innovation: the importance of context	<i>Tourism Planning and Development</i>
Kline et al. (2014)	A Spatial Analysis of Tourism, Entrepreneurship and the Entrepreneurial Ecosystem in North Carolina, USA	<i>Baltic journal of management</i>
Kshetri (2014)	Developing successful entrepreneurial ecosystems: lessons from a comparison of an asian tiger and a baltic tiger	<i>Organization for Economic Co-operation and Development (OECD)</i>
Mason and Brown (2014)	Entrepreneurial ecosystems and growth oriented entrepreneurship	<i>International journal of entrepreneurship and innovation management</i>
Riccé et al. (2014)	University-based entrepreneurship ecosystems: a global study of six educational institutions	<i>Urban Studies</i>
Mack and Mayer (2016)	The evolutionary dynamics of entrepreneurial ecosystems	<i>Education and training</i>
Maritz et al. (2015)	The status of entrepreneurship education in australian universities	<i>Community development</i>
Markkley et al. (2015)	Creating entrepreneurial communities: building community capacity for ecosystem development	<i>European planning studies</i>
Stam (2015)	Entrepreneurial ecosystems and regional policy: a sympathetic critique	<i>Entrepreneurship and Sustainability Issues</i>
Drejeris (2015)	Entrepreneurship ecosystem: methodological approaches to functions' review of public sector institutions	<i>Regional studies</i>
Brown et al. (2016)	A post-mortem of regional innovation policy failure: scotlands intermediate technology initiative (iti)	

Table 1 (continued)

Author (Year)	Article's Title	Source
Isenberg and Onyiah (2016)	Fostering Scaleup Ecosystems for Regional Economic Growth	<i>Global Entrepreneurship Congress 2016</i>
Mack and Mayer (2016)	The evolutionary dynamics of entrepreneurial ecosystems	<i>Urban studies</i>
Mehta et al. (2016)	An educational and entrepreneurial ecosystem to actualize technology-based social ventures	<i>Advances in engineering education</i>
Acs et al. (2017b)	The lineages of the entrepreneurial ecosystem approach	<i>Small Business Economics</i>
Alvareden and Boschma (2017)	A critical review of entrepreneurial ecosystems research: towards a future research agenda	<i>European Planning Studies</i>
Audretsch and Belitski (2017)	Entrepreneurial ecosystems in cities: establishing the framework conditions	<i>Journal of Technology Transfer</i>
Auerswald and Dani (2017)	The adaptive life cycle of entrepreneurial ecosystems: the biotechnology cluster	<i>Small Business Economics</i>
Brown and Mason (2017)	Looking inside the spiky bits: a critical review and conceptualisation of entrepreneurial ecosystems	<i>Small Business Economics</i>
Bruns et al. (2017)	Searching for the existence of entrepreneurial ecosystems: a regional cross-section growth regression approach	<i>Small Business Economics</i>
Kuratko et al. (2017)	The paradox of new venture legitimization within an entrepreneurial ecosystem	<i>Small Business Economics</i>
Spigel (2017)	The relational organization of entrepreneurial ecosystems	<i>Entrepreneurship: theory and practice</i>
Sussan and Acs (2017)	The digital entrepreneurial ecosystem	<i>Small Business Economics</i>

innovation” (p.3). The ecosystem construct in literature on strategy and innovation places emphasis on the “demand side” and focuses on value appropriation rather than merely on value creation, which is, instead, the case with other constructs, such as clusters, networks and related topics (e.g. innovation network, industry network, value network). More importantly, the aspect of complexity plays a crucial role as a determinant for recreating competitive advantage and innovation in business and innovation ecosystems, respectively. One great advantage of using the ecosystem concept and its related construct is that it becomes immediately obvious that the previous linear model has become obsolete (e.g. value chain), since it underestimates the complexity of doing business between a wide spectrum of actors in an environment featuring multiple interdependencies.

Moving on to entrepreneurship, scholars refer to the entrepreneurial ecosystem as the interaction of systemic conditions and framework conditions – thus considering both the biotic and the abiotic components of the EE (Stam and Spigel 2016). Hence, in the same way as the system of living organisms is considered to be at the heart of the ecosystem in biology, in entrepreneurship, the systemic conditions, such as networks of entrepreneurs, leadership, finance, talent, knowledge and support services, are considered to be at the heart of the entrepreneurial ecosystem, while the framework conditions entail a social context that enables or constrains human interaction (Stam and Spigel 2016). In a similar vein, Autio and Levie (2015); Sussan and Acs (2017) use the terms agents and micro-ecosystem, respectively, when referring, the former, to the biotic component and, the latter, to the institutional and macro-ecosystem for the abiotic component of the entrepreneurial ecosystem. A virtuous and reinforcing cycle can be generated between the biotic and abiotic components, which are regarded as linked together through nutrient cycles and energy flows (Sussan and Acs 2017), whereas, in an EE such flows can be represented by local “successful” startups with a proven business model that scale up globally. It is, indeed, very likely that these “successful” startups bring value back - from the global to the local arena - in the form, for instance, of financial resources to be invested in other local and promising startups. Policymakers should make it priority to activate cycles of this kind and so enable these flows.

According to Mason and Brown (2014), the ecological approach of the EE framework has links to ‘economic gardening’, seen as a metaphor for local economic development, where specific environments promote high numbers of both new business startups and high-growth firms. Auerswald (2015) compares EEs to dynamically stable networks of interconnected organisms and inorganic resources that form their own distinct domain of analysis. The biological/ecological view of entrepreneurship can help us to establish the structure of the ecosystem and the relationships within it. Ecosystems are also described as geographically bounded areas with mutually dependent components (Auerswald 2015; Napier and Hansen 2011). The dynamics of ecosystems are analyzed through ecological concepts such as diversity, selection, related diversification, resilience and adaptation (Auerswald and Dani 2017; Boschma 2015; Alvedalen and Boschma 2017). According to Roundy et al. (2017), scholars should carefully consider the biological metaphor of the ecosystem: they argue that the EE is more complex than the biological ecosystem, since, in the latter, agents have no aspirations about how the system should function.

As a whole, using the biological analogy, it is clear the concept of EE is driving towards an approach to entrepreneurship that is evolutionary, socially interactive

and non-linear (Cooke 2016; Colombelli et al. 2017). In particular, the ecosystem approach draws attention to the fact that entrepreneurship takes place in a community of interdependent actors, individuals, entities and regulatory bodies within a given geographic area (Freeman and Audia 2006; Isenberg 2010; Malecki 2011; Kuratko et al. 2017).

Entrepreneurship literature already provides several definitions of EE. Table 2 contains a list of the main EE definitions provided in literature. In reality, the concept has been used diversely in literature, making it rather ‘chaotic’ (Martin and Sunley 2003) or ‘fuzzy’ (Markusen 1999). According to Spiegel, the concept can be seen as “[...] a conceptual umbrella encompassing a variety of different perspectives on the geography of entrepreneurship rather than a coherent theory” (Spigel 2017, p. 1). In this paper, on the basis of Stam (2015, p. 5), we take entrepreneurial ecosystem to mean a “set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory”. Early definitions of EE (e.g. Van de Ven 1993; Spilling 1996; Neck et al. 2004) have pointed out two main aspects: 1) the interaction between actors and components is a dimension of complexity; and 2) the creation of new ventures is the end aim of the EE. Other scholars describe in more detail the actors and components involved in EE (e.g. Mason and Brown 2014; Isenberg 2011) and introduce a regional development perspective as its ultimate aim. Building on previous contributions, Stam (2015) has the merit of shifting the locus of EE’s investigation to “productive” (i.e. innovative and growth-oriented) entrepreneurship, which is a key change in perspective for entrepreneurship research - typically more inclusive and wide-ranging when considering new ventures. In a similar vein, Spigel (2017) captured this “productive” dimension, connecting it to a broad stream of research in entrepreneurship literature that already existed before the concept of EE had emerged. Moreover, according to Stam’s (2015) definition, territory-specificity is a dimension of EE rather than a tool for regional and local EE development (see Spilling 1996; Cohen 2006). Following Stam (2015), other scholars have stressed the “territory”-specific dimension of an EE (e.g. Colombelli et al. 2017; Cavallo et al. 2018), despite the argument that the current trends of digital technology and globalization should be reducing spatial dependence (Anselin et al. 1997; Florida et al. 2017; Acs et al. 2017a, b).

In view of these arguments, Stam’s (2015) definition has been widely endorsed in literature for its comprehensive nature, since it encompasses all the key features of the EE (Acs et al. 2017a, b).

By comparing the EE construct with business and innovation ecosystems, we can highlight some key EE features. EE constructs share several aspects with business and innovation ecosystems, mostly connected to the “ecosystem approach” itself. In particular, EE emphasizes the complexity and non-linearity of entrepreneurship, properties that, previously, were equally a major feature of business and innovation ecosystems in the fields of strategy and innovation, respectively. Identifying the precise boundaries of an ecosystem may be an impossible task (Iansiti and Levien 2004); therefore, entrepreneurial, business and innovation ecosystems all typically encompass several shared domains. For instance, the innovation domain is central to innovation ecosystems as well as to “productive” EEs. Similarly, collaboration between large organizations and small innovative new ventures are a crucial component of business and innovation as well as of

Table 2 Definitions of the entrepreneurial ecosystem

Authors (year)	Article's Title	Source	Definition of EE
Van de Ven (1993)	<i>The development of an infrastructure for entrepreneurship</i>	<i>Journal of Business Venturing</i>	“Networks of actors involved in developing each function, and how these functions and networks of actors interacted over time to facilitate and constrain innovation development” (p.218)
Spilling (1996)	<i>The Entrepreneurial System: On Entrepreneurship in the Context of a Mega-Event</i>	<i>Journal of Business Research</i>	“The entrepreneurial system consists of a complexity and diversity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region or locality” (p.1)
Neck et al. (2004)	<i>An Entrepreneurial System View of New Venture Creation</i>	<i>Journal of Small Business Management</i>	Entrepreneurial ecosystems are defined as the interacting components of entrepreneurial systems, which foster new firm creation in a specific regional context.
Cohen (2006)	<i>Sustainable Valley Entrepreneurial Ecosystems</i>	<i>Business Strategy and the Environment</i>	“Sustainable entrepreneurial ecosystems are defined as an interconnected group of actors in a local geographic community committed to sustainable development through the support and facilitation of new sustainable ventures” (p. 3)
Isenberg (2011)	<i>Introducing the entrepreneurship ecosystem: Four defining characteristics</i>	<i>Forbes</i>	“The entrepreneurship ecosystem consists of six domains. Actually, the entrepreneurship ecosystem consists of hundreds of specific elements that, for convenience, we group into six general domains: a conducive culture, enabling policies and leadership, availability of appropriate finance, quality human capital, venture-friendly markets for products, and a range of institutional and infrastructural supports” (p.1)
Roberts and Easley (2011)	<i>Entrepreneurial impact: the role of MIT-an updated report</i>	<i>Foundations and Trends in Entrepreneurship</i>	“A complex community of living and non-living things that are functioning together as a unit” (p.51)
Qian et al. (2012)	<i>Regional systems of entrepreneurship: The nexus of human capital, knowledge and new firm formation</i>	<i>Journal of Economic Geography</i>	“Those economic, social, institutional and all other important factors that interactively influence the creation, discovery and exploitation of entrepreneurial opportunities” (p. 561).
Acis et al. (2014)	<i>National systems of entrepreneurship: Measurement issues and policy implications.</i>	<i>Research Policy</i>	“A dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations, by individuals which drives the allocation of resources through the creation and operation of new ventures.” (p.479)

Table 2 (continued)

Authors (year)	Article's Title	Source	Definition of EE
Mason and Brown (2014)	<i>Entrepreneurial ecosystems and growth oriented entrepreneurship^a</i>	<i>Organization for Economic Co-operation and Development (OECD)</i>	“A set of interconnected entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g. the business birth rate, numbers of high growth firms, levels of ‘blockbuster entrepreneurship’, number of serial entrepreneurs, degree of self-out mentality within firms and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment” (p. 5)
Mack and Mayer (2016)	<i>The evolutionary dynamics of entrepreneurial ecosystems</i>	<i>Urban Studies</i>	“Entrepreneurial ecosystems (EE) consist of interacting components, which foster new firm formation and associated regional entrepreneurial activities” (p.3)
Stam (2015)	<i>Entrepreneurial Ecosystems and Regional Policy: A Sympathetic Critique</i>	<i>European Planning Studies</i>	“The entrepreneurial ecosystem as a set of interdependent actors and factors coordinated in such a way that they enable productive entrepreneurship within a particular territory (p.1765)
Audretsch, and Belitski (2017)	<i>Entrepreneurial ecosystems in cities: establishing the framework conditions</i>	<i>The Journal of Technology Transfer</i>	“A dynamic community of inter dependent actors (entrepreneurs, suppliers, buyer, government, etc.) and system-level institutional, informational and socioeconomic contexts... interact via information technologies and networks to create new ideas and more efficient policies” (p. 4)
Auerswald and Dami (2017)	<i>The adaptive life cycle of entrepreneurial ecosystems: the biotechnology cluster</i>	<i>Small Business Economics</i>	“Represents the higher-level infrastructure that enables interactions between the entrepreneurial agents and institutions in the industrial sector... They cut across industries and focus on the environment surrounding entrepreneurs - with entrepreneurs and entrepreneurship clearly at the centre” (p.98 and p.113)
Bruns, Bosma, Sanders, and Schramm (2017)	<i>Searching for the existence of entrepreneurial ecosystems: a regional cross-section growth regression approach</i>	<i>Small Business Economics</i>	“Entrepreneurial ecosystem as a multidimensional set of interacting factors that moderate the effect of entrepreneurial activity on economic growth” (p.1)

Table 2 (continued)

Authors (year)	Article's Title	Source	Definition of EE
Kuratko et al. (2017)	<i>The paradox of new venture legitimization within an entrepreneurial ecosystem</i>	<i>Small Business Economics</i>	“Entrepreneurial ecosystem as coordinated attempts to establish environments that are conducive to the probabilities of success for new ventures following their launch... entrepreneurial ecosystems are focused on creating environments conducive to the success of entrepreneurs and their new ventures” (p.120)
Spigel (2017)	<i>The Relational Organization of Entrepreneurial Ecosystems</i>	<i>Entrepreneurship Theory and Practice</i>	“A combination of social, political, economic, and cultural elements within a region that support the development and growth of innovative start-ups and encourage nascent entrepreneurs and other actors to take the risks of starting, funding, and otherwise assisting high-risk ventures” (p.50)

^a Background paper prepared for the workshop organised by the OECD LEED Programme and the Dutch Ministry of Economic Affairs on Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship

entrepreneurial ecosystems. Nevertheless, when analyzing collaborations of this kind, the perspective changes for entrepreneurial, business and innovation ecosystems in terms of their focal point, critical relations and main outcome. In business ecosystems, a focal firm must learn how to orchestrate its ecosystem so that it can pursue a competitive advantage (Iansiti and Levien 2004); in innovation ecosystems, the main aim is to create new value through innovation (Autio and Thomas 2014); while, in EEs, the focal point is represented by the creation of new ventures (Stam 2015).

Together with creating the abstract concept of an EE, the extant literature has also produced a considerable number of frameworks that describe the main components and key attributes of an EE (Kuratko et al. 2017, p. 5). Borrowing from Mason and Brown (2014), an EE is made up of “...entrepreneurial actors (both potential and existing), entrepreneurial organizations (e.g. firms, venture capitalists, business angels, banks), institutions (universities, public sector agencies, financial bodies) and entrepreneurial processes (e.g. the business birth rate, numbers of high growth firms, levels of ‘blockbuster entrepreneurship’, number of serial entrepreneurs, degree of sell-out mentality within firms and levels of entrepreneurial ambition) which formally and informally coalesce to connect, mediate and govern the performance within the local entrepreneurial environment”. Early research on EEs focused on the economic actors in charge of building the EE, their interaction through formal and informal networks, the environmental factors that exist in a given region and the physical infrastructures found there (Spilling 1996; Neck et al. 2004; Cohen 2006). Subsequently, more detailed representations of an EE have emerged (Isenberg 2011; Feld 2012; WEF 2013; Mason and Brown 2014). Irrespective of the differences between the elements characterizing this second generation of EE frameworks, all highlight the importance of entrepreneurial culture within the ecosystem.

The flourishing of frameworks that describe EEs also encountered its critics. According to several scholars (e.g. Stam 2015), too much attention has been spent on the elements of the system without proper importance being given to the connections between these elements and their dynamics of evolution (Acs et al. 2016). Some of the frameworks have been dismissed as nothing more than a “long laundry list of relevant factors without a clear reasoning of cause and effect” (Stam 2015, p.1764). These EE frameworks have proposed a static point of view that describes relationships within an EE without considering its evolution over time (Borissenko and Boschma 2017) and where all the elements seem to be considered as equally important. Furthermore, the EE literature has been criticized for its poor clarity concerning the level of analysis (e.g. city, region or country) relating to this approach (Stam 2015).

Hence, addressing the lack of any dynamic and multi-scalar perspective or a cause-effect relationship seems to be the starting point for all eventual future studies on EEs, with the purpose of creating core analytical EE frameworks (Mack and Mayer 2016). The open debates and direction of future research will be discussed in detail in the following sections.

Antecedents of the entrepreneurial ecosystem

The traditional entrepreneurship literature had focused heavily on the ‘Schumpeterian’ entrepreneur, while little attention has been spent on studying the systemic nature of

entrepreneurship (Zahra and Wright 2011; Zahra et al. 2014). Research in entrepreneurship has tended to neglect the role of context, providing as a consequence generic models of entrepreneurial activity (Zahra et al. 2014). The context was mostly considered by means of a proxy or control variables without any deeper analysis of the cultural, social and economic structures that have a high influence over the entrepreneurs' action space and the efficiency of their action. Before the outset of entrepreneurial ecosystem research, only few scholars dwelled on the role of an entrepreneurial-friendly environment (Pennings 1982; Dubini 1989; Van de Ven 1993; Bahrami and Evans 1995). These contributions can be considered as antecedents of EE research. In actual fact, EE research builds on a specific pillar: without the right socio-economic conditions, the Schumpeterian entrepreneur's efforts may prove to be vain. Contextual variables have been the locus of investigation in regional development literature. According to Acs et al. (2017a, b), a family of related concepts, which include industrial districts, regional industrial clusters, regional and/or national innovation systems and innovative milieus, and are part of the wider regional development literature, are themselves antecedents of EE research (Arkan and Schilling 2011; Delgado et al. 2010; Pyke et al. 1990; Marshall 1920). In common with the literature on regional development, EE research also places extreme attention on institutional factors and on regional and social settings. Specifically, while adopting an ecosystem perspective, scholars recognize that social context plays a fundamental role in allowing (and restricting) entrepreneurship, without discarding the individual perspective (Acs et al. 2014; Neck et al. 2004). Although the Schumpeterian tradition greatly shapes regional development literature, national innovation systems treat individuals almost exogenously. Entrepreneurship is a broader field which includes contexts relating to temporal, social, organizational and market dimensions (Zahra 2007; Zahra et al. 2014). EE research combines contextual factors relating to the individual in a truly systemic view of entrepreneurship (Stam 2015; Sussan and Acs 2017). There has been a shift in the locus of investigation from entrepreneurs seen as 'economic supermen' to entrepreneurship seen as a process embedded in a particular social and local context (Steyaert and Katz 2004).

Location may also have a great and complex influence over entrepreneurship (Johannisson 2011). Cooke (2016) argues that the emerging research into EE necessarily entails an evolutionary, socially interactive and non-linear approach. In particular, according to his evolutionary perspective, individual and collective learning inevitably takes place between firms and their supporting institutional factors. The interactive nature of the entrepreneurial process is in contrast with previous literature based on a unitary, atomistic and individualistic view of entrepreneurship (Cooke 2016). On the other hand, the role of the Schumpeterian entrepreneurs in the EE approach is not only retained, but is crucial and, according to Feld (2012, p.25), is "the most critical component of a startup community is that entrepreneurs must lead it". In addition, Feld (2012) says that the attempts by policymakers to build an entrepreneurial environment often fail because of a lack of engagement with entrepreneurs.

In a similar vein, innovation system literature can also be considered as an antecedent to EE. Both these literature streams explore how institutions influence the interactions within the networks of actors and how they are involved in the generation, diffusion and use of innovations (Borissenko and Boschma 2017). The main difference lies, however, in the fact that literature on innovation systems focuses on organizations

and institutions, treating individuals as if they were external to the subject matter, while in EE the focal point is the entrepreneur, rather than the enterprise.

According to Acs et al. (2017a, b), literature on strategy also contains concepts that can be regarded as antecedents to EE research. He specifically refers to the concept of the business ecosystem, introduced by Moore (1993). One great merit of the business ecosystem concept is that it introduces the need to orchestrate a set of actors if a value proposition is to materialize in the market (Adner 2017). Business ecosystems are seen as the context in which firms must exercise their capacity of creating and capturing value generated in the surrounding systems, producing complementary products and services (Moore 1993; Iansiti and Levien 2004; Adner and Kapoor 2010; Williamson and De Meyer 2012; Ben Letaifa and Reynoso 2015; Acs et al. 2017a, b). Acs et al. (2017a, b) claim that the entrepreneurial ecosystem may represent the breeding ground for a business ecosystem. Autio et al. (2017) provide a further argument that links strategy literature and EE research, stating that there is a “predominance of business model innovation...” within the EE (Autio et al. 2017, p. 6). Experimenting with business models is facilitated in an entrepreneurial ecosystem, since entrepreneurs can create and capture value by interacting with the key EE actors. EEs are systems that entail the entrepreneurial opportunities of discovering, pursuing and scaling up new ventures (Acs et al. 2014; Autio et al. 2017). In this context, digitization plays a fundamental role in enabling new ventures to re-invent the way in which they create, capture and deliver value (Autio et al. 2017; Prahalad and Ramaswamy 2003; Urbinati et al. 2018) within an EE.

The current debate on EE research highlights the point that the EE is not an industry-specific concept, which is instead the case for industrial districts and other cluster forms embedded in regional development literature (Autio et al. 2017; Spigel 2017; Pitelis 2012). Investigations into EEs should embrace firms operating in a variety of industries, all of which must necessarily be innovative and growth-oriented (Stam and Spigel 2016). Furthermore, recently scholars have argued that digitization is reducing spatial dependence and that entrepreneurship is becoming much less of a local phenomenon (Autio et al. 2017), thus highlighting another reason to remove EE research from the category of traditional literature on regional development. Opposing this view, other scholars still consider the local dimension to be crucial for investigating entrepreneurship (Acs et al. 2017a, b); they consider it useful to analyze EE by drawing on regional development mechanisms, such as district economies, urban economies and localization economies. Table 3 summarizes the main antecedents of EE research.

Entrepreneurial ecosystem research: investigation guidelines

The current debate on entrepreneurial ecosystems is still open on several critical points. Recent literature has provided several definitions for EE, as well as a number of reference frameworks describing the key EE elements and factors (Kuratko et al. 2017; Alvedalen and Boschma 2017). The antecedents of EE taken from regional development and strategy literature have been described in many studies (Acs et al. 2017a, b) and empirical investigations have also been conducted in specific social contexts (Stam and Spigel 2016). Acs et al. (2014) used quantitative methods to analyze a number of strong entrepreneurial ecosystems that resulted in innovative

Table 3 Antecedents of the entrepreneurial ecosystem

Concept	Emphasis /Key findings	Examples
<i>Industrial districts</i>	It emphasizes the local division of labour of an industry and the concentration of small businesses of a similar character in particular localities, leveraging on external economies of scale.	<i>Marshall (1920)</i>
<i>Regional industrial clusters</i>	It focuses on geographic concentrations of interconnected companies, which benefit from the local sectoral specialisation and knowledge spillovers.	<i>Porter (1998)</i>
<i>City/Regional/ National innovation systems</i>	Refer to the networks and institutions linking knowledge producing hubs such as universities and public research labs with innovative firms within a city/region/nation. These linkages allow knowledge to spill over between different organizations, increasing a region's overall innovativeness	<i>Cooke et al. (1997)</i>
<i>Business ecosystem</i>	It refers to the set of partners that need to be brought into alignment in order for a value proposition to materialize in the market place	<i>Moore (1993); Adner (2017)</i>
<i>Entrepreneurial Infrastructure</i>	It focuses on how the networks of actors involved in developing several functions interact over time to facilitate and constrain innovation development.	<i>Van de Ven (1993)</i>
<i>Entrepreneurial environment</i>	It refers to a combination of environmental conditions (economic, sociocultural, and political factors) that play a role in the development of entrepreneurship and enhancement of entrepreneurial activities.	<i>Dubini (1989), Gnyawali and Fogel (1994)</i>
<i>Entrepreneurial system</i>	It refers to diversity and complexity of actors, roles, and environmental factors that interact to determine the entrepreneurial performance of a region.	<i>Spilling (1996)</i>
<i>Entrepreneurial ecosystems</i>	It emphasizes the interactions of entrepreneurial attitudes, abilities, and aspirations characterizing the individuals, which drive the creation and operation of new ventures.	<i>Acs et al. (2014)</i>

entrepreneurship. Other studies have focused on how a rich EE can enable entrepreneurship (Fritsch 2013; Tsvetkova 2015; Spigel 2017). Even when they do not introduce the specific term EE, other works on regions, including Silicon Valley (Saxenian 1994; Kenney and Patton 2005), Washington DC (Feldman 2001) and Kyoto (Aoyama 2009) have examined the factors that nurture entrepreneurship within a specific environment (Stam and Spigel 2016). Recently, Acs et al. (2017a, b) have looked at the number of Unicorns (i.e. new ventures valued at more than \$1 billion), considering this to be a measure of performance for an EE. This use is consistent with the definition of EE provided by Stam (2015), which predominately means a productive entrepreneurship emanating from ambitious entrepreneurs who are keen to grow rapidly and scale up as soon as possible (Stam et al. 2012). Neumeyer et al. (2017) used social network data analysis to examine the EE, seen as a complex social organization. Scholars have also provided comparisons between EEs (e.g. Kshetri 2014), while using measures that are traditional in entrepreneurship, such as job creation, while Bell-Masterson and Stangler (2015) have provided an early proposal to weigh and measure EEs.

Although several empirical investigations have been undertaken on EEs, little is known about how an EE can be studied, evaluated and measured. EEs have been widely recognized as complex and “evolving” and dynamic systems (Acs et al. 2014; Feld 2012; Isenberg 2010; Spigel 2017; Dubina et al. 2017). Studying a dynamic and complex system as a whole may ultimately be an irksome task, and scholars are still asking themselves which methods are best suited to this challenge (Harrison et al. 2007). In keeping with one of the main goals of this study, we are offering a set of guidelines that can be used to assess and gain a fully comprehensive understanding of an EE.

Building on the main constituting concepts found in EE’s definition provided by Stam (2015), in Table 4, we have shown the EE guidelines and related supporting extant research. Following on, we will provide the theoretical foundation and description of each Entrepreneurial Ecosystem guideline.

EE Investigation guideline 1: Study the main entrepreneurial dynamics and their governance

The term entrepreneurial dynamics typically refers to three main phases in a startup lifecycle, from its formation to its stability or exit phase (Kazanjian 1988). These three phases are: a) new venture creation; b) new venture growth and c) new venture stability or exit phase – which, in the best case, can lead to an initial public offering (IPO) and, in the worst case, to a write-off. Hayward et al. (2006) argue that the literature on entrepreneurship should examine the overall entrepreneurial process, from when a new venture is formed to its exit, and so include the failures. The extant literature explains how interaction among different actors can influence entrepreneurial dynamics. For instance, according to Gartner (1985), entrepreneurial creation dynamics are the outcome of the interaction among several actors and factors. He pays particular attention to “environmental” factors, which may arguably be considered as antecedents of EE research. Stam and Elfring (2008) have shown how the performance of a new venture can be influenced by networks and social ties between entrepreneurs both within and from outside that specific industry. Dutta and Folta (2016), Croce et al. (2016);

Table 4 EE Research: investigation guidelines

EE conceptualization (Stam 2015)	EE research - Investigation Guidelines	Extant research
“set of interdependent actors”	1) <i>Study the main entrepreneurial dynamics and their governance</i>	e.g. Dutta and Folia 2016; Croce et al. 2016; Colombo and Grilli 2010; Stam and Elfring 2008; Grimaldi and Grandi 2005; Colombelli et al. 2017.
..“enable productive entrepreneurship” ..	2) <i>Start from analysis of sub-systems or micro-systems part of the wider Entrepreneurial Ecosystem</i>	e.g. Miller and Acs 2017; Steman 2000; Ghaffarzadegan et al. 2011; Forrester 2007; Pruyt 2013.
..“within a..territory”	3) <i>Focus on innovative and growth oriented entrepreneurship</i>	e.g. Shane 2009; Stam et al. 2012; Mason and Brown 2013; Hennekson and Sanandaji 2014; Stam and Spigel 2016.
	4) <i>Focus on a specific territory</i>	e.g. Neck, 2004; Acs et al. 2017a, b; Anselin et al. 1997; Florida et al. 2017; Acs et al. 2017a, b

Colombo and Grilli (2010) have investigated the role played by investors in affecting a new venture's performance and growth. Recently, Nylund and Cohen (2017), while introducing the concept of collision density (Cohen and Muñoz 2016), have investigated the growth of urban EEs. Grimaldi and Grandi (2005) have examined the interaction between new ventures and incubators, while explaining the dynamics of entrepreneurial creation. Similarly, Pena (2004) analyzed the influence of incubators on entrepreneurial growth dynamics. These examples are merely a selection from among the numerous studies that examine entrepreneurial dynamics resulting from the interaction between new ventures and other actors, although they do not explicitly adopt an ecosystem perspective. Moreover, the debate is currently open on how these entrepreneurial dynamics can be governed (see e.g. Colombo et al. 2017) and which key actors are likely to play a major role here. Among the proposed candidates are: nothing/nobody; Isenberg's (2010) "invisible hand"; policymakers; (Stam 2015); universities (Miller and Acs 2017); large corporations (Bhawe and Zahra 2017), investors (Colombo and Murtinu 2017); and joint ventures (Audretsch and Link 2017). Questions have also been raised about the phase in the EE evolutionary process in which these actors should participate and intervene (Colombelli et al. 2017). There is, thus, an emerging need to place order among the recent and valuable contributions and create a common perspective shared by scholars on the governance mechanisms that regulate the EE evolutionary process.

EE Investigation guideline 2: analyze sub-systems of the wider entrepreneurial ecosystem

Scholars in EE research have criticized the systematic use of static approaches modeling the EE and its main relationships (Mack and Mayer 2016; Mason and Brown 2014; Spigel 2017; Alvedalen and Boschma 2017). EEs are evolving, socially interactive and non-linear systems (Cooke 2016), where successful entrepreneurs can contribute towards creating the conditions and culture that spur on further entrepreneurial development (Spigel 2017). This can be considered as a virtuous or self-reinforcing cycle. Spigel (2017), indeed, has observed that, in an EE, elements can develop simultaneously and reinforce each other, though they can never replace one another completely (Acs et al. 2014). Roundy et al. (2017) argued in favour of the heterogeneous nature of EEs, considering the diversity of the relative participants, type of ventures, business models and support organizations. Other scholars have called attention to the "connectivity" between EE elements/actors, seeing them as interconnected and interdependent on each other (Motoyama and Knowlton 2017). As described above, the entrepreneurial ecosystem can, therefore, be considered as a system that is complex and adaptive or dynamic (Acs et al. 2014; Feld 2012; Isenberg 2010; Spigel 2017; Neumeier et al. 2017). Forrester (1970), followed by Sterman (2001) and other scholars, developed a mathematical modelling technique to frame and study a complex and dynamic system. Using simulations and computer modelling, this methodology became quite successful and effective in both the public and private sectors. In line with this, some scholars have provided early studies that introduce system dynamics into EE research (Yearworth 2010; Yun et al. 2017): however, so far, simulations have been applied in a very limited manner within the management field – especially when dealing with qualitative rather than quantitative information – and the area is still underdeveloped due to issues in the

validation process (Harrison et al. 2007). Scholars have also questioned the feasibility of modelling a complex and dynamic system as a whole (Pruyt 2013). One of the traps that novice modellers fall into is to build big models to address big issues. The assumption is that the more all-encompassing and detailed the model, the more “valid” it tends to be and there is a general tendency to model “big problems with big models” (Barlas 2007, p.470). However, it may be more useful to develop smaller systems, focusing on one part of a wider ecosystem (Sterman 2000; Ghaffar zadegan et al. 2011). This concept was taken up by Forrester (2007) himself, who argued that smaller models can be incredibly powerful. As result, for instance, some scholars have recently decided to focus on smaller but representative sub-systems that are part of the wider EE (see Miller and Acs 2017; Huang-Saad et al. 2016).

EE Investigation guideline 3: Focus on innovative and growth-oriented entrepreneurship

Previous research had already focused on high-quality startups. For instance, basing their research on signalling theory, several scholars have concentrated on funded startups or, more precisely, on VC-backed startups (e.g. Davila et al. 2003). The need to focus on “productive entrepreneurship” emerged explicitly in Stam (2015), as he provided the very definition of EE. In exploring entrepreneurial ecosystems, Stam (2015) and Acs et al. (2014) observed that EEs should lead to successful entrepreneurs and firms. In line with this, Acs et al. (2017a, b) proposed to concentrate on Unicorns, a small elite group of startups that had demonstrated their scalable potential by exploiting a given platform strategy (Evans and Schmalensee 2016). However, by narrowing the entrepreneurial ecosystem to Unicorns, taken as the expression or symbol of the best of the best new ventures, we risk losing part of the entrepreneurial picture. Thus, scholars consider the entrepreneurs’ intention² as the strongest predictor of entrepreneurial activity (Krueger et al. 2000; Obschonka et al. 2010) and focus on firms led by ambitious entrepreneurs who intend to grow and scale rapidly – i.e. high-growth startups or ‘scale-ups’ (Stam et al. 2012; World Economic Forum 2013; Mason and Brown 2014; Stam and Spigel 2016). According to Alvedalen and Boschma (2017), EE research aims to provide an explanation of entrepreneurship and, specifically, of high-quality, ambitious entrepreneurship. Although this may seem over-exclusive, it is clear that EE research does not, by definition, include the traditional entrepreneurship and traditional indicators of entrepreneurship, such as ‘self-employment’ or ‘small businesses’ (Stam and Spigel 2016). As a result, the literature on entrepreneurship shows a growing and predominant interest in innovative and growth-oriented new ventures, rather than on the traditional measures of entrepreneurship (Shane 2009; Stam et al. 2012; Mason and Brown 2013; Henrekson and Sanandaji 2014; Stam and Spigel 2016; Cavallo et al. 2018).

EE Investigation guideline 4: Focus on a specific territory

Although Acs et al. (2014) recently undertook a cross-country analysis, making a comparison between various entrepreneurial ecosystems, several scholars have

² Entrepreneurial intention is defined as the conscious state of mind that directs personal attention, experience and behaviour towards planned entrepreneurial behaviour (Bird 1988)

specifically directed their research towards studying region-specific ecosystems (Fritsch 2013; Tsvetkova 2015; Spigel 2017). Even before the emergence of EE research, some scholars would refer to a specific territory. Saxenian (1994) and Kenney and Patton (2005) analyzed the agglomeration of tech firms in Silicon Valley. Similarly, Feldman (2001) focused on Washington DC and Aoyama (2009) on the city of Kyoto (Stam and Spigel 2016). Cluster literature employed various mechanisms, including Marshallian economies, Jacob economies and district economies, to reach the conclusion that new venture agglomerations are localized and regional systems of learning and innovation (Autio et al. 2017; Asheim et al. 2011). Autio et al. (2017, p. 20), however, argued that the “locus of entrepreneurial opportunities exploited by new ventures in entrepreneurial ecosystems are largely external to a cluster”, as a result of digitization and globalization. In other words, entrepreneurship is losing its local dimension. In opposition to this view and in agreement with Acs et al. (2017a, b), Anselin et al. (1997); Florida et al. (2017), we have considered the local dimension to still be a dominant ingredient in entrepreneurship, and deserving of further research.

Avenues for future research on entrepreneurial ecosystem

In this section, we discuss the main underdeveloped topics of research, following on from each of the investigation guidelines previously proposed. Therefore, we have suggested and formulated a set of promising research questions that could advance EE research.

EE Investigation guideline 1: research questions

As stated previously, a wide body of entrepreneurship literature is already involved in exploring the main entrepreneurial dynamics of new venture creation, growth, and stability – though less attention has been spent on the cases of failure. Therefore, we are adamant that studies on new venture lifecycles are essential if we are to gain an understanding of EEs, since several EE scholars consider the lifecycle to be at the heart of EE research (Stam 2015).

At this point, scholars should embrace a further step and focus on what we could call the dynamics and governance of the entrepreneurial ecosystem. Scholars should advance the current understanding of how to create an EE, what makes it grow and, ultimately, what leads to a sustainable EE. The traditional literature on entrepreneurship sheds light on the main entrepreneurial dynamics, by focusing on new ventures and their interaction with a few other agents/actors, which, actively or passively, take part in the wider EE life. Future studies should try to involve a wider spectrum of actors that play a major role in the EE lifecycle – i.e. its creation, growth, stability or sustainability – in order to advance the EE research along the right lines. Hence, we suggest the following questions:

- Q1: How is an EE created?
- Q2: How is the EE’s growth nurtured?
- Q3: How is the EE’s sustainability ensured?

Moreover, scholars should study whether entrepreneurial ecosystems are governed by “natural” and/or “artificial” mechanisms (Colombo et al. 2017),

which allow them to exploit their potential to its full, in terms of entrepreneurial dynamics. A reasonable answer could be that we must find a sensible equilibrium between heavy policy intervention and self-regulating mechanisms, although scholars are still debating on this point. In addition, policymakers have the faculty of introducing measures that make a direct impact on entrepreneurial dynamics or, more realistically, they can facilitate and encourage “natural” and self-regulating mechanisms. As a result, this argument opens up a very promising debate on the role that policymakers should play in EEs. Specifically:

- Q4: How should policymakers intervene to enable rather than regulate the entrepreneurial dynamics concerning the origins, growth and stability of new ventures?

EE Investigation guideline 2: research questions

One of the main concerns of scholars with reference to EE research is to define how an EE can be studied. The tendency to model “big problems with big models” (Barlas 2007, p.470) is also found in studies dealing with EEs as complex and dynamic systems (Acs et al. 2014). Similarly, we have witnessed the systematic use of static approaches to model EEs and their main relationships (Mack and Mayer 2016; Mason and Brown 2014; Spigel 2017; Alvedalen and Boschma 2017). Studying complex and dynamic systems has never been an easy task. This is especially true when modelling a complex and dynamic system as a whole from a static perspective. While dealing with this issue, scholars have been trying to draw on system dynamics (SD) and simulation methodology (e.g. Yearworth 2010), others have made use of network analysis (Neumeier et al. 2017). While we recognize that applying SD as mentioned above could be problematic in management-related fields of research (Harrison et al. 2007), it may be a welcome methodological challenge for scholars keen to publish more work. This consideration leads to the following methodological research question:

- Q5: How can the System Dynamics methodology support EE research?

In addition, and consistently with the investigation guidelines set out above, another way to deal with the complexity of EEs is to focus on its main sub-components and how they interact (Simatupang et al. 2015). Several scholars have concentrated on smaller sub-systems, that are however representative of the wider EE, such as business incubators (e.g. Theodoraki and Messeghem 2017). Scholars engaged in early attempts to study EEs by making use of SD methodology are also concentrating on smaller subsystems. Yearworth (2010), for instance, studied a subsystem composed of new ventures, incubators and investors. We believe that identifying and understanding the main sub-systems of an EE and, accordingly, studying their interactions, is potentially a promising direction for future research. This could lead to distinguishing between critical and non-critical sub-systems, and scholars and policymakers should be aware of this distinction. Isenberg (2010) argues that policymakers should act to enhance every aspect and component of an EE. While we believe that this remark is true, realistically, it cannot always be applied. As scholars, we should help policymakers to

identify priorities and focal components of EEs. As a result, we have proposed a further set of research questions:

- Q6: Which critical EE sub-systems should policymakers give greater priority to?
- Q7: How do critical EE sub-systems interact?
- Q8: What are the key relations between critical sub-systems and between critical and non-critical subsystems in an EE?

EE Investigation guideline 3: research questions

Regarding the third guideline, we can clearly see that most of the extant research is already going in the direction of investigating innovative and growth-oriented entrepreneurship. For instance, several special issues recently published in academic outlets, such as *Research Policy* and the *Strategic Entrepreneurship Journal*, have dealt explicitly with Digital Entrepreneurship. Generally, digital ventures are considered as an expression of “productive entrepreneurship”, which is implicitly associated with innovation and growth-orientation. Furthermore, some scholars have already introduced the concept of the digital entrepreneurial ecosystem (Sussan and Acs 2017). However, scholars should not take for granted that every digital new venture is innovative *per se* and, on the contrary, that everything that is not digital is not innovative. In addition, the hi-tech sector also includes industries other than digital, such as clean-tech, life-science and biotech. Several suggested research questions stem from this area:

- Q9: What are the factors that enable the growth of new digital ventures?
- Q10: What is the relationship between the growth of new ventures (firm level) and that of EEs (system level)?
- Q11: What are the key similarities and differences between EEs and Digital EEs?

EE Investigation guidelines 4: research questions

As a fourth investigation guideline, we argue that the local dimension is still relevant, despite the processes of digitization and globalization (Autio et al. 2017). Scholars have investigated EE at urban, regional and national level. We believe that the optimal level of analysis for an EE is still a matter in need of further contributions. For instance, scholars may use network analysis to identify where there is a dense network of relationships. As a consequence, we have set the final research question:

- Q12: How can the optimal level of analysis for the EE be identified?

Conclusion

This study provides a critical literature review on EE and the avenues for future research. We have reviewed the concept of EE, its key attributes and the antecedents stemming from entrepreneurship, strategy and regional development literature.

Combining prior research with building on the main constituting concepts of the entrepreneurial ecosystem, we have developed an original set of guidelines for scholars and practitioners, which can help in the process of gaining a comprehensive understanding of an entrepreneurial ecosystem. Finally, we have discussed the opportunities for extending our current knowledge and directing future research on entrepreneurial ecosystems, and developed a set of suggested research questions.

This study is not free of limitations. First, our literature review is based on a selected sample of relevant articles dealing with EE research, rather than being an extensive or systematic process. It follows that, as the selection was partly influenced by the authors' critical opinion of whether a given study was relevant or not to EEs, there is the possibility that other potentially relevant studies were excluded during the selection process. Basing the literature review on the more inclusive Scopus database could possibly reduce this limitation, whereas our careful critical scrutiny of the articles to decide whether a document was to be included or excluded certainly helped our sample to be more significant. Second, while the definition taken from Stam (2015) and used to determine the four investigation guidelines is robust and comprehensive when compared to the whole body of knowledge on EE, had we selected a different pivotal definition, this may have led to identifying other areas of investigation. Third, the suggested research questions pertinent to each investigation area could have been fine-tuned or split into a selection of alternatives or sub-questions. However, supplying a fully comprehensive list of perfectly honed research questions goes beyond the objective of this review on EEs as a whole.

Beyond these limitations, this study contributes to EE research by providing a review of the key concepts that emerged in the extant research on EE. We addressed the current debate on EE research, which remains open on several critical points, such as its definitions and the role of its antecedents. More importantly, we have prepared a set of investigation guidelines that scholars could consider when attempting to gain a comprehensive understanding of a specific EE, although we are fully aware that scholars may be unable to follow those guidelines in a single study. Hence, we expect that several studies - framed within a broad research field while remaining consistent internally - will be necessary, if we are to attain a true in-depth understanding of a specific local EE. Our study can serve as common ground for such research endeavours.

The study also has direct policymaking implications. The investigation guidelines provided by us are directed to policymakers who deal with the measures and mechanisms for encouraging economic growth. Several works have shown that promoting entrepreneurship is a key action point in this sense. However, when dealing with entrepreneurship, policymakers have recently been introduced to and induced by scholars (e.g. Isenberg 2010) to adopt an ecosystem perspective. The ecosystem perspective more than likely fuzzy and dispersive, making it difficult to adopt without driving guidelines. While this study has contributed towards clarifying the EE concept, it also intends to address future research avenues that may help policymakers engaged in the crucial work of encouraging economic growth through the enhancement of the entrepreneurship that is developing within various ecosystems.

Acknowledgements We would like to thank the Editor in Chief and the anonymous Reviewers, who helped significantly enhancing the study's contributions. We are also immensely grateful to Per Davidsson, Dean A. Shepherd, Jasmina Berbegal-Mirabent and Stephen Cox for sharing their knowledge and experience with us during the course of this research. Any errors remain our own.

References

- Acs, Z. J., Autio, E., & Szerb, L. (2014). National systems of entrepreneurship: Measurement issues and policy implications. *Research Policy*, *43*(3), 476–494.
- Acs, Z. J., Audretsch, D. B., Lehmann, E. E., & Licht, G. (2016). National systems of entrepreneurship. *Small Business Economics*, *46*(4), 527–535.
- Acs, Z. J., Estrin, S., Mickiewicz, T., & Szerb, L. (2017a). Institutions, entrepreneurship and growth: the role of national entrepreneurial ecosystems.
- Acs, Z. J., Stam, E., Audretsch, D. B., & O'Connor, A. (2017b). The lineages of the entrepreneurial ecosystem approach. *Small Business Economics*, 1–10.
- Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented innovation: a systematic review. *International Journal of Management Reviews*, *18*(2), 180–205.
- Adams, R. J., Smart, P., & Huff, A. S. (2017). Shades of grey: guidelines for working with the grey literature in systematic reviews for management and organizational studies. *International Journal of Management Reviews*, *19*(4), 432–454.
- Adner, R. (2017). Ecosystem as structure: an actionable construct for strategy. *Journal of Management*, *43*(1), 39–58.
- Adner, R., & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*, *31*(3), 306–333.
- Alchian, A. A. (1950). Uncertainty, evolution, and economic theory. *Journal of Political Economy*, *58*(3), 211–221.
- Alvedalen, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: towards a future research agenda. *European Planning Studies*, *25*(6), 887–903.
- Anselin, L., Varga, A., & Acs, Z. (1997). Local geographic spillovers between university research and high technology innovations. *Journal of Urban Economics*, *42*(3), 422–448.
- Aoyama, Y. (2009). Entrepreneurship and regional culture: The case of Hamamatsu and Kyoto, Japan. *Regional Studies*, *43*(3), 495–512.
- Ankan, A. T., & Schilling, M. A. (2011). Structure and governance in industrial districts: implications for competitive advantage. *Journal of Management Studies*, *48*(4), 772–803.
- Asheim, B. T., Smith, H. L., & Oughton, C. (2011). Regional innovation systems: theory, empirics and policy. *Regional Studies*, *45*(7), 875–891.
- Audretsch, D. B., & Belitski, M. (2017). Entrepreneurial ecosystems in cities: establishing the framework conditions. *The Journal of Technology Transfer*, *42*(5), 1030–1051.
- Audretsch, D. B., & Link, A. N. (2017). Embracing an entrepreneurial ecosystem: an analysis of the governance of research joint ventures. *Small Business Economics*, 1–8.
- Auerswald, P. E. (2015). Enabling entrepreneurial ecosystems: Insights from ecology to inform effective entrepreneurship policy.
- Auerswald, P. E., & Dani, L. (2017). The adaptive life cycle of entrepreneurial ecosystems: the biotechnology cluster. *Small Business Economics*, 1–21.
- Autio, E., & Levie, J. (2015). *Management of entrepreneurial ecosystems*. Mimeo: Imperial College Business School.
- Autio, E., & Thomas, L. (2014). Innovation ecosystems. *The Oxford Handbook of Innovation Management*, 204–288.
- Autio, E., Kenney, M., Mustar, P., Siegel, D., & Wright, M. (2014). Entrepreneurial innovation: The importance of context. *Research Policy*, *43*(7), 1097–1108.
- Autio, E., Nambisan, S., Thomas, L. D., & Wright, M. (2017). Digital Affordances, Spatial Affordances, and the Genesis of Entrepreneurial Ecosystems.
- Bahrami, H., & Evans, S. (1995). Flexible re-cycling and high-technology entrepreneurship. *California Management Review*, *37*(3), 62–89.
- Barlas, Y. (2007). Leverage points to march “upward from the aimless plateau”. *System Dynamics Review*, *23*(4), 469–473.
- Barreto, I. (2010). Dynamic capabilities: A review of past research and an agenda for the future. *Journal of Management*, *36*(1), 256–280.
- Bell-Masterson, J., & Stangler, D. (2015). Measuring an entrepreneurial ecosystem.
- Ben Letaifa, S., & Reynoso, J. (2015). Toward a service ecosystem perspective at the base of the pyramid. *Journal of Service Management*, *26*(5), 684–705.

- Bhawe, N., & Zahra, S. A. (2017). Inducing heterogeneity in local entrepreneurial ecosystems: the role of MNEs. *Small Business Economics*, 1–18.
- Bird, B. (1988). Implementing entrepreneurial ideas: The case for intention. *Academy of management Review*, 13(3), 442–453.
- Borissenko, J., & Boschma, R. (2017). A critical review of entrepreneurial ecosystems research: towards a future research agenda (No. 2017/3). Lund University, CIRCLE-Center for Innovation, Research and Competences in the Learning Economy.
- Boschma, R. (2015). Towards an evolutionary perspective on regional resilience. *Regional Studies*, 49(5), 733–751.
- Brown, R., & Mason, C. (2017). Looking inside the spiky bits: a critical review and conceptualisation of entrepreneurial ecosystems. *Small Business Economics*, 49(1), 11–30.
- Brown, R., Gregson, G., & Mason, C. (2016). A post-mortem of regional innovation policy failure: Scotland's Intermediate Technology Initiative (ITI). *Regional Studies*, 50(7), 1260–1272.
- Bruns, K., Bosma, N., Sanders, M., & Schramm, M. (2017). Searching for the existence of entrepreneurial ecosystems: a regional cross-section growth regression approach. *Small Business Economics*, 49(1), 31–54.
- Cavallo, A., Ghezzi, A., Colombelli, A., & Casali, G. L. (2018). Agglomeration dynamics of innovative start-ups in Italy beyond the industrial district era. *International Entrepreneurship and Management Journal*, 1–24.
- Chapin, F. S., Matson, P. A., & Mooney, H. A. (2002). Terrestrial decomposition (pp. 151–175). Springer New York.
- Clarysse, B., Wright, M., Bruneel, J., & Mahajan, A. (2014). Creating value in ecosystems: Crossing the chasm between knowledge and business ecosystems. *Research Policy*, 43(7), 1164–1176.
- Cohen, B. (2006). Sustainable valley entrepreneurial ecosystems. *Business Strategy and the Environment*, 15(1), 1–14.
- Cohen, B., & Muñoz, P. (2016). The Emergence of the Urban Entrepreneur: How the Growth of Cities and the Sharing Economy Are Driving a New Breed of Innovators: How the Growth of Cities and the Sharing Economy Are Driving a New Breed of Innovators. ABC-CLIO.
- Colombelli, A., Paolucci, E., & Ughetto, E. (2017). Hierarchical and relational governance and the life cycle of entrepreneurial ecosystems. *Small Business Economics*, 1–17.
- Colombo, M. G., & Grilli, L. (2010). On growth drivers of high-tech start-ups: Exploring the role of founders' human capital and venture capital. *Journal of Business Venturing*, 25(6), 610–626.
- Colombo, M. G., & Murtinu, S. (2017). Venture capital investments in Europe and portfolio firms' economic performance: Independent versus corporate investors. *Journal of Economics and Management Strategy*, 26(1), 35–66.
- Colombo, M. G., Dagnino, G. B., Lehmann, E. E., & Salmador, M. (2017). The governance of entrepreneurial ecosystems. *Small Business Economics*, 1–10.
- Cooke, P. (Ed.). (2016). Routledge Revivals: Localities (1989): The Changing Face of Urban Britain. Routledge.
- Cooke, P., Uranga, M. G., & Etxebarria, G. (1997). Regional innovation systems: Institutional and organisational dimensions. *Research policy*, 26(4-5), 475–491.
- Croce, A., Guerini, M., & Ughetto, E. (2016). Angel Financing and the Performance of High-Tech Start-Ups. *Journal of Small Business Management*.
- Darwin, C. (1859). On the origin of the species by natural selection.
- Davidsson, P., Delmar, F., & Wiklund, J. (2006). Entrepreneurship and the Growth of Firms. Edward Elgar Publishing.
- Davila, A., Foster, G., & Gupta, M. (2003). Venture capital financing and the growth of startup firms. *Journal of Business Venturing*, 18(6), 689–708.
- De Massis, A., Frattini, F., & Lichtenthaler, U. (2013). Research on technological innovation in family firms: Present debates and future directions. *Family Business Review*, 26(1), 10–31.
- Delgado, M., Porter, M. E., & Stern, S. (2010). Clusters and entrepreneurship. *Journal of Economic Geography*, 10(4), 495–518.
- Di Stefano, G., Peteraf, M., & Verona, G. (2010). Dynamic capabilities deconstructed: a bibliographic investigation into the origins, development, and future directions of the research domain. *Industrial and Corporate Change*, 19(4), 1187–1204.
- Drejeris, R. (2015). Entrepreneurship ecosystem: methodological approaches to functions' review of public sector institutions. *Entrepreneurship and Sustainability Issues*, 2(3), 118–132.
- Dubina, I. N., Campbell, D. F., Carayannis, E. G., Chub, A. A., Grigoroudis, E., & Kozhevina, O. V. (2017). The Balanced Development of the Spatial Innovation and Entrepreneurial Ecosystem

- Based on Principles of the Systems Compromise: A Conceptual Framework. *Journal of the Knowledge Economy*, 8(2), 438–455.
- Dubini, P. (1989). The influence of motivations and environment on business start-ups: Some hints for public policies. *Journal of Business Venturing*, 4(1), 11–26.
- Dutta, S., & Folta, T. B. (2016). A comparison of the effect of angels and venture capitalists on innovation and value creation. *Journal of Business Venturing*, 31(1), 39–54.
- Erina, I., Shatrevich, V., & Gaile-Sarkane, E. (2017). Impact of stakeholder groups on development of a regional entrepreneurial ecosystem. *European Planning Studies*, 25(5), 755–771.
- Evans, D. S., & Schmalensee, R. (2016). Matchmakers: the new economics of multisided platforms. Harvard Business Review Press.
- Feld, B. (2012). Startup communities: Building an entrepreneurial ecosystem in your city. John Wiley & Sons.
- Feldman, M. P. (2001). The entrepreneurial event revisited: firm formation in a regional context. *Industrial and Corporate Change*, 10(4), 861–891.
- Felekoglu, B., & Moultrie, J. (2013). Top Management Involvement in New Product Development: A Review and Synthesis. *Journal of Product Innovation Management*, 31(1), 159–175.
- Florida, R., Adler, P., & Mellander, C. (2017). The city as innovation machine. *Regional Studies*, 51(1), 86–96.
- Forrester, J. W. (1970). Urban dynamics. *IMR; Industrial Management Review* (pre-1986), 11(3), 67.
- Forrester, J. W. (2007). System dynamics—a personal view of the first fifty years. *System Dynamics Review*, 23(2–3), 345–358.
- Freeman, J. H., & Audia, P. G. (2006). Community ecology and the sociology of organizations. *Annual Review of Sociology*, 32, 145–169.
- Fritsch, M. (2013). New business formation and regional development: A survey and assessment of the evidence. *Foundations and Trends® in Entrepreneurship*, 9(3), 249–364.
- Gartner, W. B. (1985). A conceptual framework for describing the phenomenon of new venture creation. *Academy of Management Review*, 10(4), 696–706.
- Ghaffarzadegan, N., Lyeis, J., & Richardson, G. P. (2011). How small system dynamics models can help the public policy process. *System Dynamics Review*, 27(1), 22–44.
- Ghezzi, A., Gabelloni, D., Martini, A., & Natalicchio, A. (2017). Crowdsourcing: a review and suggestions for future research. *International Journal of Management Reviews*.
- Grimaldi, R., & Grandi, A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation*, 25(2), 111–121.
- Gurevitch, J., Scheiner, S. M., & Fox, G. A. (2006). *The ecology of plants* (No. QK 901. G87 2006). Sunderland: Sinauer Associates.
- Gustafsson, R., & Autio, E. (2011). A failure trichotomy in knowledge exploration and exploitation. *Research Policy*, 40(6), 819–831.
- Gnyawali, D. R., & Fogel, D. S. (1994). Environments for entrepreneurship development: key dimensions and research implications. *Entrepreneurship theory and practice*, 18(4), 43–62.
- Harrison, R. T., & Leitch, C. (2010). Voodoo institution or entrepreneurial university? Spin-off companies, the entrepreneurial system and regional development in the UK. *Regional Studies*, 44(9), 1241–1262.
- Harrison, J. R., Lin, Z., Carroll, G. R., & Carley, K. M. (2007). Simulation modeling in organizational and management research. *Academy of Management Review*, 32(4), 1229–1245.
- Hayward, M. L., Shepherd, D. A., & Griffin, D. (2006). A hubris theory of entrepreneurship. *Management Science*, 52(2), 160–172.
- Henrekson, M., & Sanandaji, T. (2014). Small business activity does not measure entrepreneurship. *Proceedings of the National Academy of Sciences*, 111(5), 1760–1765.
- Hoskisson, R. E., Yiu, D., & Kim, H. (2004). Corporate governance systems: Effects of capital and labor market congruency on corporate innovation and global competitiveness. *The Journal of High Technology Management Research*, 15(2), 293–315.
- Huang-Saad, A., Fay, J., & Sheridan, L. (2016). Closing the divide: accelerating technology commercialization by catalyzing the university entrepreneurial ecosystem with I-Corps™. *The Journal of Technology Transfer*, 1–21.
- Iansiti, M., & Levien, R. (2004). Strategy as ecology. *Harvard Business Review*, 82(3), 68–81.
- Isenberg, D. J. (2010). How to start an entrepreneurial revolution. *Harvard Business Review*, 88(6), 40–50.
- Isenberg, D. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. Presentation at the Institute of International and European Affairs.
- Isenberg, D., & Onyemah, V. (2016). Fostering Scaleup Ecosystems for Regional Economic Growth (Innovations Case Narrative: Manizales-Mas and Scale Up Milwaukee). *Innovations: Technology, Governance, Globalization*, 11(1-2), 60–79.

- Johannisson, B. (2011). Towards a practice theory of entrepreneuring. *Small Business Economics*, 36(2), 135–150.
- Jung, K., Eun, J. H., & Lee, S. H. (2017). Exploring competing perspectives on government-driven entrepreneurial ecosystems: lessons from Centres for Creative Economy and Innovation (CCEI) of South Korea. *European Planning Studies*, 25(5), 827–847.
- Kazanjian, R. K. (1988). Relation of dominant problems to stages of growth in technology-based new ventures. *Academy of Management Journal*, 31(2), 257–279.
- Kenney, M., & Patton, D. (2005). Entrepreneurial geographies: Support networks in three high-technology industries. *Economic Geography*, 81(2), 201–228.
- Kline, C., Hao, H., Alderman, D., Kleckley, J. W., & Gray, S. (2014). A spatial analysis of tourism, entrepreneurship and the entrepreneurial ecosystem in North Carolina, USA. *Tourism Planning & Development*, 11(3), 305–316.
- Krueger, N. F., Reilly, M. D., & Carsrud, A. L. (2000). Competing models of entrepreneurial intentions. *Journal of Business Venturing*, 15(5), 411–432.
- Kshetri, N. (2014). Developing successful entrepreneurial ecosystems: Lessons from a comparison of an Asian tiger and a Baltic tiger. *Baltic Journal of Management*, 9(3), 330–356.
- Kuratko, D. F., Fisher, G., Bloodgood, J. M., & Hornsby, J. S. (2017). The paradox of new venture legitimization within an entrepreneurial ecosystem. *Small Business Economics*, 1–22.
- Letaifa, S. B., & Rabeau, Y. (2013). Too close to collaborate? How geographic proximity could impede entrepreneurship and innovation. *Journal of Business Research*, 66(10), 2071–2078.
- Mack, E. A., & Mayer, H. (2016). The evolutionary dynamics of entrepreneurial ecosystems. *Urban Studies*, 53(10), 2118–2133.
- Mack, E. A., & Qian, H. (2016). *Geographies of Entrepreneurship*. Routledge.
- Malecki, E. J. (1997). Entrepreneurs, networks, and economic development: A review of recent research. *Advances in Entrepreneurship, Firm Emergence and Growth*, 3, 57–118.
- Malecki, E. J. (2011). Connecting local entrepreneurial ecosystems to global innovation networks: open innovation, double networks and knowledge integration. *International Journal of Entrepreneurship and Innovation Management*, 14(1), 36–59.
- Maritz, A., Jones, C., & Shwetzzer, C. (2015). The status of entrepreneurship education in Australian universities. *Education+ Training*, 57(8/9), 1020–1035.
- Markley, D. M., Lyons, T. S., & Macke, D. W. (2015). Creating entrepreneurial communities: building community capacity for ecosystem development. *Community Development*, 46(5), 580–598.
- Markusen, A. (1999). Fuzzy concepts, scanty evidence, policy distance: the case for rigour and policy relevance in critical regional studies. *Regional Studies*, 33(9), 869–884.
- Mars, M. M., Bronstein, J. L., & Lusch, R. F. (2012). The value of a metaphor: Organizations and ecosystems. *Organizational Dynamics*, 41(4), 271–280.
- Marshall, A. (1920). Industry and trade: a study of industrial technique and business organization; and of their influences on the conditions of various classes and nations. Macmillan.
- Martin, R., & Sunley, P. (2003). Deconstructing clusters: chaotic concept or policy panacea? *Journal of Economic Geography*, 3(1), 5–35.
- Mason, C., & Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics*, 40(2), 211–225.
- Mason, C., & Brown, R. (2014). Entrepreneurial ecosystems and growth oriented entrepreneurship. *Final Report to OECD, Paris*, 30(1), 77–102.
- Mehta, K., Zappe, S., Brannon, M. L., & Zhao, Y. (2016). An Educational and Entrepreneurial Ecosystem to Actualize Technology-Based Social Ventures. *Advances in Engineering Education*, 5(1), n1.
- Miller, D. J., & Acs, Z. J. (2017). The campus as entrepreneurial ecosystem: the University of Chicago. *Small Business Economics*, 1–21.
- Molles, M. C. M. C. (2002). Ecology: concepts and applications (No. Sirsi) i9780070294165).
- Moore, J. F. (1993). Predators and prey: a new ecology of competition. *Harvard Business Review*, 71(3), 75–83.
- Motoyama, Y., & Knowlton, K. (2017). Examining the connections within the startup ecosystem: A Case Study of St. Louis. *Entrepreneurship Research Journal*, 7(1).
- Nambisan, S., & Baron, R. A. (2013). Entrepreneurship in innovation ecosystems: entrepreneurs' selfregulatory processes and their implications for new venture success. *Entrepreneurship Theory and Practice*, 37(5), 1071–1097.
- Napier, G., & Hansen, C. (2011). Ecosystems for young scalable firms. FORA Group.
- Neck, H. M., Meyer, G. D., Cohen, B., & Corbett, A. C. (2004). An entrepreneurial system view of new venture creation. *Journal of Small Business Management*, 42(2), 190–208.

- Nelson Richard, R., & Winter Sidney, G. (1982). *An evolutionary theory of economic change*. Cambridge: Harvard Business School Press.
- Neumeayer, X., He, S., & Santos, S. C. (2017, June). The social organization of entrepreneurial ecosystems. In Technology & Engineering Management Conference (TEMSCON), 2017 IEEE (pp. 1-6). IEEE.
- Nylund, P. A., & Cohen, B. (2017). Collision density: driving growth in urban entrepreneurial ecosystems. *International Entrepreneurship and Management Journal*, 13(3), 757–776.
- Obschonka, M., Silbereisen, R. K., & Schmitt-Rodermund, E. (2010). Entrepreneurial intention as developmental outcome. *Journal of Vocational Behavior*, 77(1), 63–72.
- Pena, I. (2004). Business incubation centers and new firm growth in the Basque country. *Small Business Economics*, 22(3–4), 223–236.
- Pennings, J. M. (1982). The urban quality of life and entrepreneurship. *Academy of Management Journal*, 25(1), 63–79.
- Pitelis, C. (2012). Clusters, entrepreneurial ecosystem co-creation, and appropriability: a conceptual framework. *Industrial and Corporate Change*, 21(6), 1359–1388.
- Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*, 76(6), 77–90. Boston.
- Prahalad, C. K., & Ramaswamy, V. (2003). The new frontier of experience innovation. *MIT Sloan Management Review*, 44(4), 12–18.
- Pruyt, E. (2013). Small system dynamics models for big issues: Triple jump towards real-world complexity.
- Pyke, F., Becattini, G., & Sengenberger, W. (Eds.). (1990). *Industrial districts and inter-firm co-operation in Italy*. International Institute for Labour Studies.
- Qian, H., Acs, Z. J., & Stough, R. R. (2012). Regional systems of entrepreneurship: the nexus of human capital, knowledge and new firm formation. *Journal of Economic Geography*, 13(4), 559–587.
- Quinn, J. B. (1979). Technological innovation, entrepreneurship, and strategy. *Sloan Management Review (pre-1986)*, 20(3), 19.
- Rice, M. P., Fetters, M. L., & Greene, P. G. (2014). University-based entrepreneurship ecosystems: a global study of six educational institutions. *International Journal of Entrepreneurship and Innovation Management*, 18(5–6), 481–501.
- Ritsilä, J. J. (1999). Regional differences in environments for enterprises. *Entrepreneurship and Regional Development*, 11(3), 187–202.
- Roberts, E. B., & Eesley, C. E. (2011). Entrepreneurial impact: The role of MIT. *Foundations and Trends® in Entrepreneurship*, 7(1–2), 1–149.
- Roundy, P. T., Brockman, B. K., & Bradshaw, M. (2017). The resilience of entrepreneurial ecosystems. *Journal of Business Venturing Insights*, 8, 99–104.
- Saxenian, A. (1994). Regional networks: industrial adaptation in Silicon Valley and route 128.
- Schramm, C.J. (2004). Building entrepreneurial economies. *Foreign Affairs*, 104–115.
- Schulze, E. D., Beck, E., & Müller Hohenstein, K. (2005). Plant ecology (No. 581.7 S386).
- Schumpeter, J. A. (1911). *Theorie der wirtschaftlichen Entwicklung*, Leipzig 1911: Duncker & Humblot; revised English edition: The Theory of Economic Development.
- Schumpeter, J. A. (1934). *The Schumpeter: theory economic development*. Harvard University Press.
- Shane, S. A. (2003). *A general theory of entrepreneurship: The individual-opportunity nexus*. Edward Elgar Publishing.
- Shane, S. A. (2009). *Technology strategy for managers and entrepreneurs*. Prentice Hall.
- Shane, S., & Venkataraman, S. (2000). The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), 217–226.
- Simatupang, T. M., Schwab, A., & Lantu, D. C. (2015). Building sustainable entrepreneurship ecosystems.
- Smith, T. M., Smith, R. L., & Waters, I. (2012). *Elements of ecology*. San Francisco: Benjamin Cummings.
- Sorenson, O., & Audia, P. G. (2000). The social structure of entrepreneurial activity: Geographic concentration of footwear production in the United States, 1940–1989. *American Journal of Sociology*, 106(2), 424–462.
- Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, 41(1), 49–72.
- Spilling, O. R. (1996). The entrepreneurial system: On entrepreneurship in the context of a mega-event. *Journal of Business Research*, 36(1), 91–103.
- Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. *European Planning Studies*, 23(9), 1759–1769.
- Stam, W., & Elfring, T. (2008). Entrepreneurial orientation and new venture performance: The moderating role of intra- and extraindustry social capital. *Academy of Management Journal*, 51(1), 97–111.
- Stam, F. C., & Spigel, B. (2016). Entrepreneurial ecosystems. USE Discussion paper series, 16(13).

- Stam, E., Bosma, N., Van Witteloostuijn, A., De Jong, J., Bogaert, S., Edwards, N., & Jaspers, F. (2012). Ambitious entrepreneurship. A review of the academic literature and new directions for public policy, AWT report, 41.
- Sterman, J. D. J. D. (2000). Business dynamics: systems thinking and modeling for a complex world (No. HD30. 2 S7835 2000).
- Sterman, J. D. (2001). System Dynamics Modeling. *California Management Review*, 43(4), 8.
- Steyaert, C., & Katz, J. (2004). Reclaiming the space of entrepreneurship in society: geographical, discursive and social dimensions. *Entrepreneurship and Regional Development*, 16(3), 179–196.
- Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics*, 1–19.
- Szerb, L., Aidis, R., & Acs, Z. J. (2013). The comparison of the global entrepreneurship monitor and the global entrepreneurship and development index methodologies. *Foundations and Trends® in Entrepreneurship*, 9(1), 1–142.
- Tansley, A. G. (1935). The use and abuse of vegetational concepts and terms. *Ecology*, 16(3), 284–307.
- Tece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350.
- Theodoraki, C., & Messegem, K. (2017). Exploring the entrepreneurial ecosystem in the field of entrepreneurial support: a multi-level approach. *International Journal of Entrepreneurship and Small Business*, 31(1), 47–66.
- Thomas, B. (1991). Alfred Marshall on economic biology. *Review of Political Economy*, 3(1), 1–14.
- Tsvetkova, A. (2015). Innovation, entrepreneurship, and metropolitan economic performance: empirical test of recent theoretical propositions. *Economic Development Quarterly*, 29(4), 299–316.
- Urbinati, A., Chiaroni, D., Chiesa, V., & Frattini, F. (2018). The role of digital technologies in open innovation processes: an exploratory multiple case study analysis. *R&D Management*, forthcoming.
- Van de Ven, H. (1993). The development of an infrastructure for entrepreneurship. *Journal of Business Venturing*, 8(3), 211–230.
- Watson, W., Ponthieu, L., & Doster, J. (1995). Business owner-managers' descriptions of entrepreneurship: A content analysis. *Journal of Constructivist Psychology*, 8(1), 33–51.
- WEF. (2013). *Entrepreneurial Ecosystems Around the Globe and Company Growth Dynamics*. World Economic Forum: Davos.
- West, J., & Bogers, M. (2013). Leveraging external sources of innovation: A review of research on open innovation. *Journal of Product Innovation Management*.
- Williamson, P. J., & De Meyer, A. (2012). Ecosystem advantage. *California Management Review*, 55(1), 24–46.
- Wong, P. K., Ho, Y. P., & Autio, E. (2005). Entrepreneurship, innovation and economic growth: Evidence from GEM data. *Small Business Economics*, 24(3), 335–350.
- Yearworth, M. (2010, July). Inductive modelling of an entrepreneurial system. In Proceedings of the 28th International Conference of the System Dynamics Society, Seoul, Korea (pp. 25–29).
- Yun, J. J., Won, D., Park, K., Yang, J., & Zhao, X. (2017). Growth of a platform business model as an entrepreneurial ecosystem and its effects on regional development. *European Planning Studies*, 25(5), 805–826.
- Zahra, S. A. (2007). Contextualizing theory building in entrepreneurship research. *Journal of Business Venturing*, 22(3), 443–452.
- Zahra, S. A., & Nambisan, S. (2011). Entrepreneurship in global innovation ecosystems. *AMS review*, 1(1), 4.
- Zahra, S. A., & Wright, M. (2011). Entrepreneurship's next act. *Academy of Management Perspectives*, 25(4), 67–83.
- Zahra, S. A., Wright, M., & Abdelgawad, S. G. (2014). Contextualization and the advancement of entrepreneurship research. *International Small Business Journal*, 32(5), 479–500.
- Zott, C., Amit, R., & Massa, L. (2011). The business model: recent developments and future research. *Journal of Management*, 37(4), 1019–1042.